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FIELD OPERATIONS WORK PLAN
WIDING TRANSPORTATION INC.
KENT, WASHINGTON

TDD F10-8706-08

NFA

Report Prepared by: Ecology and Environment, Inc.
Date: March 1988

Submitted to: J.E. Osborn, Regional Project Officer
Field Operations and Technical Support Branch
U.S. Environmental Protection Agency
Region X
Seattle, Washington

FIELD OPERATIONS WORK PLAN

PROJECT NAME: WIDING TRANSPORTATION, INC.
CONTRACT No.: 68-01-7347
TDD No.: F10-8706-08
DATE: MARCH 1988

ECOLOGY AND ENVIRONMENT, INC., SEATTLE

FIT-OM: Jeffrey D. Villnow DATE: 3/10/88

E&E PROJECT MANAGER: George A. Brooks DATE: 3/10/88

QA OFFICE CONCURRENCE: ____________ DATE: ________

ESD PEER REVIEW: ____________ DATE: ________

PROJECT NO. ____________ ACCOUNT NO. ____________

LABORATORY DESIGNATED: ____________ EPA ______ CLP ______ PRIVATE

SAMPLE NUMBERS ASSIGNED: FROM ____________ TO ____________

SAMPLE CONTROL CENTER (ESD) : ____________ DATE: ________

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1.0 INTRODUCTION

Pursuant to U.S. Environmental Protection Agency (EPA) Contract Number 68-01-7347 and Technical Directive Document (TDD) Number F10-8706-08, Ecology and Environment, Inc. (E&E) is conducting a Site Inspection (SI) of the Widing Transportation, Inc. (Widing) Site located near Midway, Washington. As a part of the inspection, samples of soil and sediment will be collected to determine if hazardous compounds from the truck rinsing operation have migrated away from the rinsate lagoon area.

From 1967 to 1986, a small portion of the site was used for tank truck rinse out and truck maintenance. The Washington State Department of Ecology (Ecology) supervised a closure and excavation of the three main rinsate lagoons in 1986. Other portions of the rinse facility and the balance of the site property were not assessed for contaminants by the Ecology lagoon closure project.

The purpose of this investigation is to conduct a screening of area soils and ground water to assess the presence and levels of contaminants which may have originated with the rinse operation. Previous analysis of soil beneath the rinsate lagoons revealed concentrations of bis(2-ethylhexyl) phthalate up to 228 ug/g, exceeding the Ecology acceptable limit of 100 ug/g. Other site soils which were possibly in contact with rinsate or raw chemicals have not been tested, suggesting the need for continued investigation of this facility.

2.0 PROJECT DESCRIPTION

2.1 Objectives and Scope

The objectives of the inspection are to:

- determine if contaminants previously found in rinsate lagoons are present at other locations on site;
- determine if contaminants have migrated off site through the surface water runoff or ground-water routes;
- assess the direction of ground water flow at the time of sampling;
- determine if wastes have been buried on site;
- determine if dioxin compounds are present in site soils because of Widing's past association with the pulp and paper industry; and
- assess the potential of the site to pose a threat to public health or the environment.

To accomplish these objectives the following general field activities will be conducted:

- an electromagnetic (EM) conductivity geophysical survey of the site will be conducted to discover potential buried waste locations;

- o composite soil boring samples will be collected from the area of suspected trenches leading off site, the former north and south drainage ditches, and an off-site location to the south;
- o discrete soil samples will be taken from a range of borehole depths in the suspected waste burial area, a former sludge storage area, and a former on-site impoundment;
- o a nearby monitoring well will be sampled to assess the possible impact of site contaminants on ground water;
- o background soil and upgradient monitoring well samples will be taken to characterize background conditions;
- o a ground water flow direction meter will be placed in monitoring wells prior to sampling to determine the direction of ground water flow;
- o all samples will be analyzed for the full range of inorganic elements and organic compounds on EPA's Target Compound List (TCL), formerly the Hazardous Substance List (Appendix A); and
- o all samples will be analyzed for dioxin and dibenzofuran homologues, including 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD).

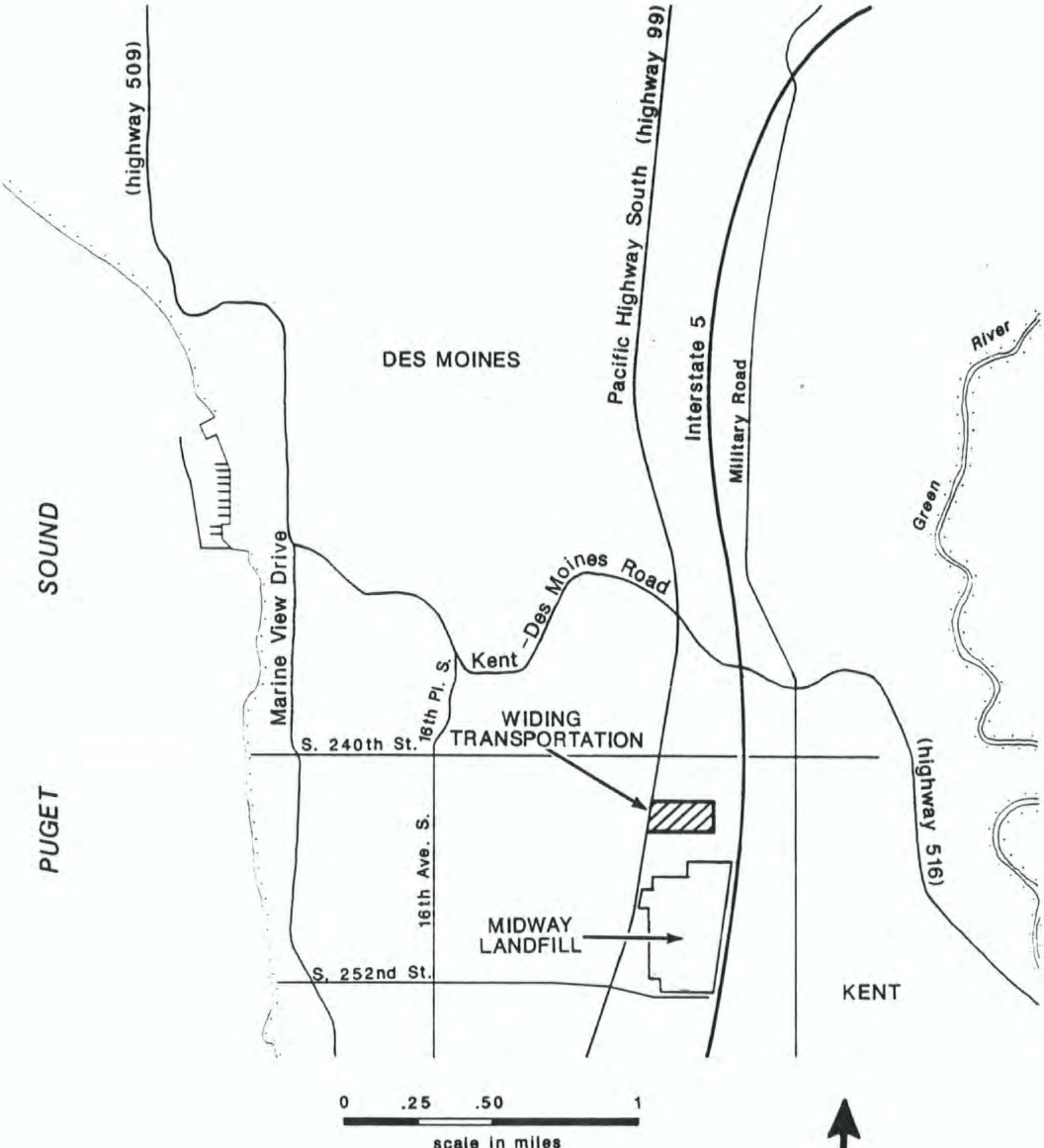
2.2 Site Location and Description

Widing Transportation, Inc., is a defunct trucking company which operated a truck maintenance and washing facility at 24300 Pacific Highway South, Kent (Midway), Washington, from 1967 to 1986 (Figure 1). The site is located less than one quarter-mile north of Midway Landfill and is adjacent to the Mobile Mansions Trailer Park, consisting of approximately 40 units.

The truck washing facility occupied approximately 1/4 acre of a 9.3-acre quadrangle owned by Widing. The remaining acreage has been leased to other companies owning heavy equipment and trucks. The facility consisted of a single building in which trucks were parked and washed, and three interconnected rinsate lagoons (Figure 2). One of the lagoons was divided into three concrete-lined chambers. The other two lagoons were unlined.

From 1966, and possibly earlier, Widing was authorized by the ICC Operating Authority (Permit #CC-567) to haul chemicals, acids, petroleum products, paper products, and other substances. Chemicals such as raw turpentine, sodium sulfide, toluene, epoxy resin, and other chemicals associated with the pulp and paper industry were rinsed out of trucks at the Midway Site. Rinsate was channeled into the series of three lagoons.

In late 1984, Widing stopped using the lagoons. In 1986, the trucking business was sold, but the Midway site property was retained by Widing stockholders. Between April 1986 and December 1986, the lagoons were closed and excavated under the direction of the Washington State Department of Ecology (Ecology). Sludge samples from the bottom of the lagoons were analyzed for over 100 potential contaminants and were determined to be of a



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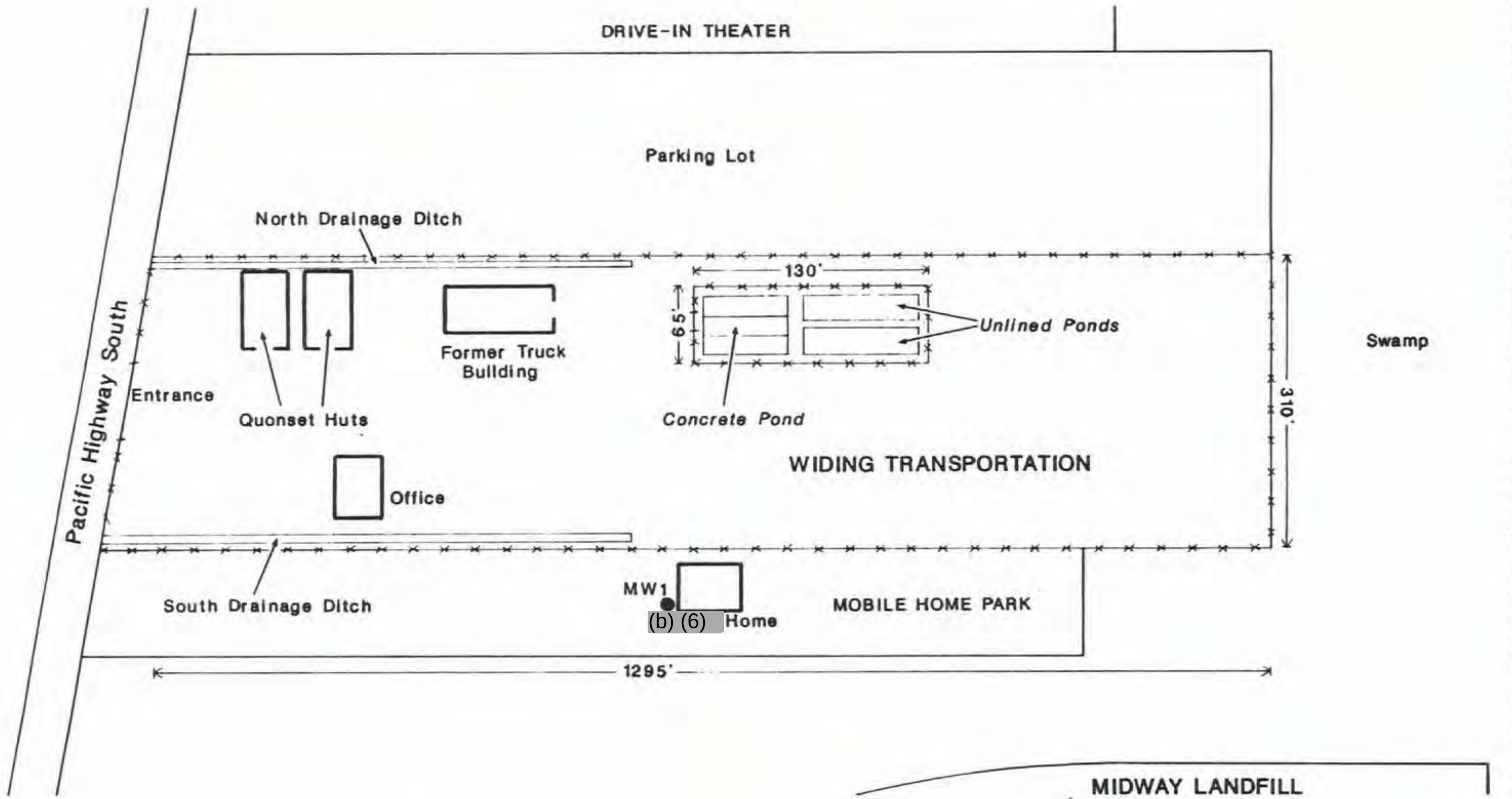
Drawn by: B.T.	Date: Dec. 10, 1987

FIGURE 1
LOCATION MAP
WIDING TRANSPORTATION
Kent, WA



LEGEND

Fence

MW1 Monitoring well

not to scale

N

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Drawn by: B.T.	Date: Dec. 9, 1987

FIGURE 2
SITE MAP CIRCA 1984
WIDING TRANSPORTATION
Kent, WA

hazardous nature due to the presence of phthalate compounds. In particular, bis(2-ethylhexyl)phthalate was found to have migrated downward into the soil beneath the lagoon area. The excavation proceeded until laboratory analysis determined the phthalate level in the soil to be less than 100 ppm. Over 900 tons of contaminated soil and sludge were shipped to a TSD (Treatment, Storage, or Disposal) facility located near Arlington, Oregon. Included in the excavation (but not analyzed) was the sludge storage area north of the lagoons. The depth of soil removal at this location was not specified. The excavated area was filled with Renton-Metro Project clean soil (City of Kent Permit #014421).

Ground water beneath the site was not sampled during the removal. Two boreholes were drilled to 35 feet in the area of the unlined lagoons under the direction of Ecology engineers. After failing to reach water at this depth, both boreholes were sealed (Ecology, 1986).

Extensive background review of Widing Transportation, Inc. has revealed various inadequacies in the management and disposal of site-generated waste, such as allowing the lagoons to overflow, uncontrolled runoff, air emissions, and improperly processed sludge (Ecology, 1979, 1985; City of Kent, 1969; EPA, 1979; PSAPCA, 1979). Surface water runoff was initially uncontrolled but was later channelled into ditches on the north and south property boundaries which discharged to the west. Runoff on the eastern half of the property continued to flow in an uncontrolled manner, following natural drainage routes at the northeast and southeast corners.

At the time of the initial site reconnaissance in July 1987, the truck wash operation no longer existed (Figure 3). Two quonset huts stood near the northwest corner of the property, immediately north of a small office building. The center of the lot consisted of a driveway covered with gravel. The truck washing building, east of the quonset huts, contained two unoccupied mobile homes. The former location of the three lagoons was marked by a portion of the wooden fence that previously surrounded the lagoons. The ground in the area was compact and covered with gravel. A small metal shed containing bags of dry concrete mix stood to the east of the former lagoon area. To the south and elsewhere on the property were large trucks and heavy equipment, such as cranes and forklifts.

2.3 Data Use

Data gathered during this investigation will be used to determine the presence of contaminants in the soils near the former rinse facility, in former drainage ditches, and in off-site drainage areas. Geophysical data will be used in an attempt to verify the locations of buried material. Quantitation of detected compounds will allow an evaluation of environmental or public health threats posed by contaminants potentially remaining on site, or in drainage areas off site.

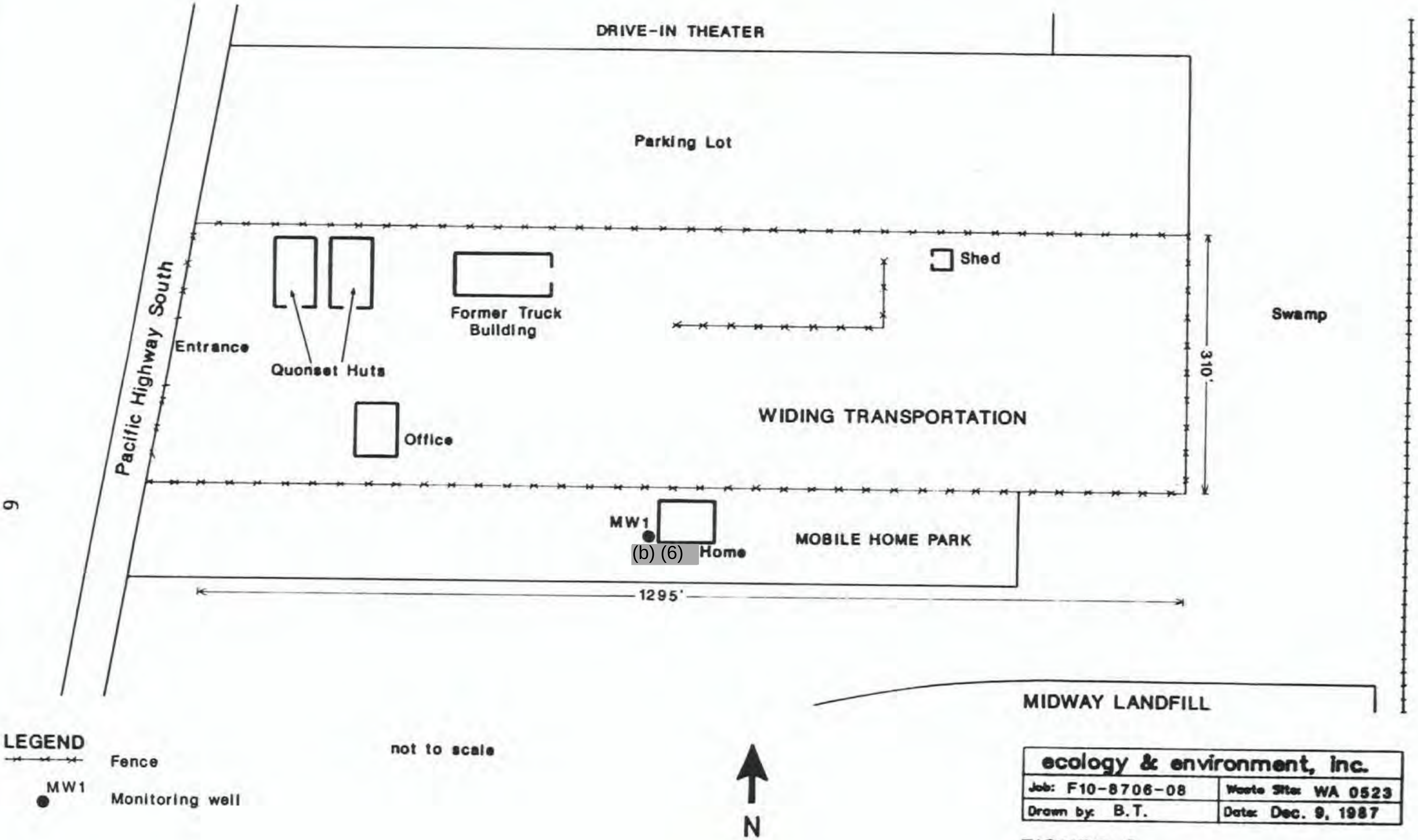

FIGURE 3
SITE MAP CIRCA 1987
WIDING TRANSPORTATION
Kent, WA

3.0 PROJECT MANAGEMENT

3.1 Project Organization and Responsibility

The following is a list of the key personnel and their responsibilities:

FIT Office Manager	: Jeffrey Villnow, E&E, Seattle
E&E Project Manager	: George Brooks, E&E, Seattle
E&E Site Manager	: Gloria Skinner, E&E, Seattle
EPA Project Officer	: John Osborn, USEPA, Region X
EPA QA Officer	: W. Towns, USEPA, Region X
Data Quality Review (EPA Lab)	: Dr. J. Blazavich, USEPA
Data Quality Review (CLP Lab)	: Andrew Hafferty, E&E, Seattle
System Performance Audit	: per REM/FIT Quality Assurance Manual

3.2 Schedule of Tasks and Milestones

The proposed work schedule for the completion of this site inspection is summarized in the milestone chart presented in Table 1.

TABLE 1

MILESTONE CHART

ACTIVITY	FEB 88				MAR 88				APR 88				MAY 88				JUN 88				JUL 88				AUG 88			
Work Plan/QA Preparation and Review	-	-	-	-	-																							
Field Work Preparation					-	-	-																					
Sample Collection								-	-																			
Analysis of Samples										-	-	-	-	-	-	-												
QA Data																	-	-										
Final Report*													-	-	-	-	-	-	-	-								

*Dependent upon receipt and QA of analytical data

4.0 GEOPHYSICAL SURVEY PLAN

The objective of the geophysical survey is to locate the alleged waste burial area on site. An electromagnetic conductivity meter manufactured by Geonics, Ltd. will be used as the main geophysical tool.

The electromagnetic (EM) conductivity technique measures the apparent terrain conductivity of a portion of the subsurface. The EM instrument transmitter coil is energized by an alternating current which generates a primary magnetic field. The primary magnetic field subsequently induces a secondary field. The ratio of the strength of the fields is proportional to the intercoil spacing and frequency of the instrument, and to the permeability and conductivity of the surrounding area (5). Terrain conductivity is dependent on several factors, including porosity, water content, and clay content. In this case, the EM will be used in an attempt to locate disturbed ground where the alleged waste burial pits were filled with soil and compacted. The EM31 allows for an effective exploration depth of up to approximately six meters (18.3 feet).

In addition to using the EM31 in its usual vertical dipole mode, the instrument will also be used in the horizontal dipole configuration by carrying the instrument on its side. The horizontal dipole is more sensitive to changes in the surficial material (soil type changes) and less sensitive to subsurface variations. Therefore, it is possible that the horizontal dipole will help detect the difference between the filled material of the alleged waste burial pits and the native soil.

A 15 x 15 foot grid pattern will be established in the area of alleged waste burial pits (Figure 4). The survey grid will extend beyond the study area in order to establish background readings. Survey lines will avoid cultural features (e.g., buildings, utility lines, fences, etc.) as the EM meter detects interference from metallic and electrical sources. Exploration depths to be used are three meters (horizontal dipole) and six meters (vertical dipole).

5.0 SAMPLING PROGRAM

5.1 Sample Types, Numbers, and Analytical Requirements

Approximately 18 soil samples and two ground water samples will be collected during the investigation. General sampling information is outlined in Table 2. All samples will be analyzed for inorganic elements and organic compounds on EPA's TCL, which includes heavy metals, base/neutral/acid extractables, pesticides, PCBs, and volatile organic compounds. Routine Analytical Services (RAS) and Special Analytical Services (SAS) analyses for dioxin and dibenzofuran homologues, including 2,3,7,8-TCDD will be performed on soil samples. Water samples will not be analyzed for dioxins. Background soil and water samples will be taken off site, and duplicate soil and water samples will be submitted to satisfy QA requirements (see Section 6.2.2). Aqueous samples collected for cyanide analyses will be screened in the field for sulfide and oxidizing agents (see Appendix C).

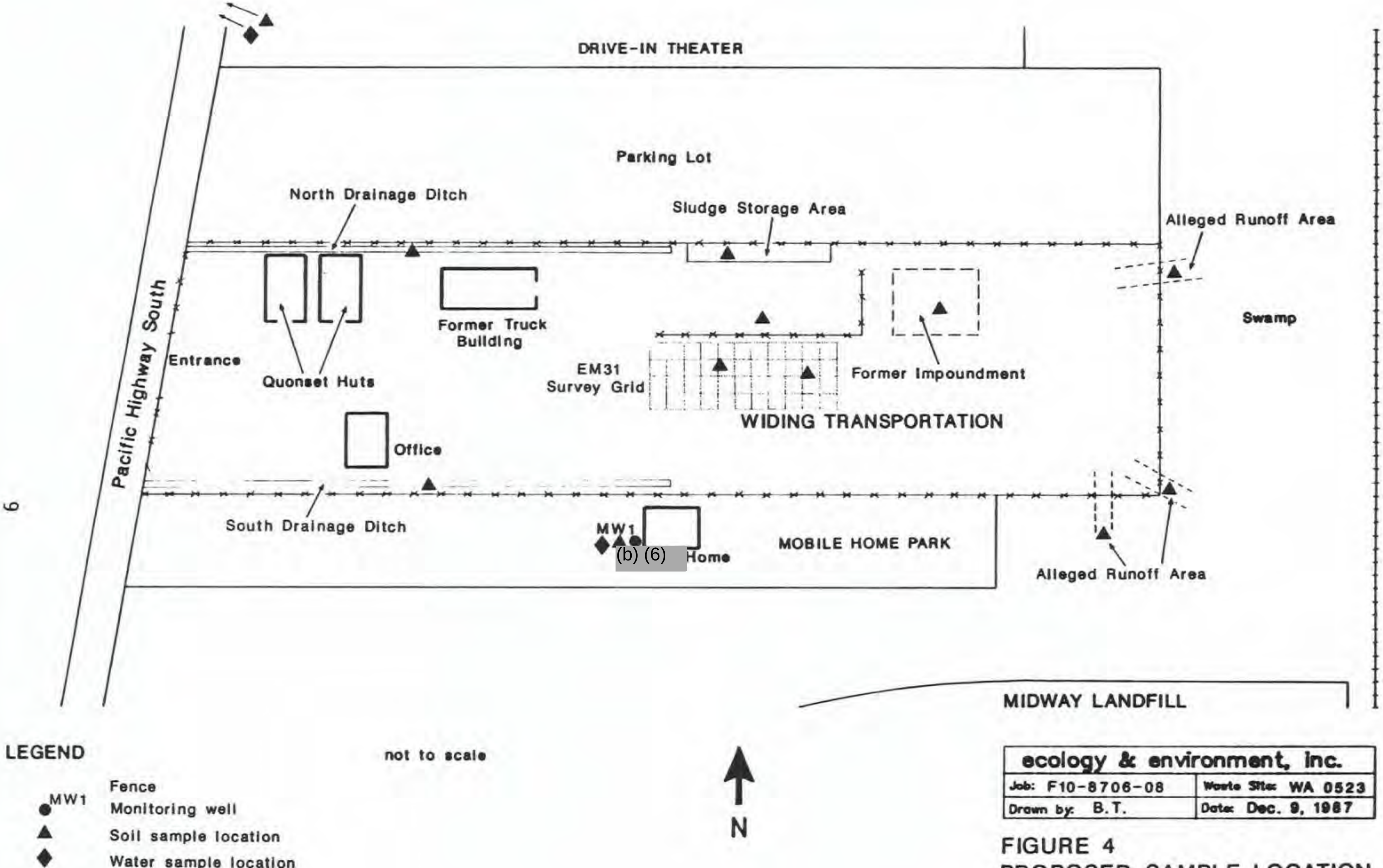

FIGURE 4
PROPOSED SAMPLE LOCATION MAP
WIDING TRANSPORTATION
Kent, WA

TABLE 2

SAMPLE SUMMARY

Sample Description Location	Number of Field Samples	QA/QC Duplicate	Sample Matrix	Sample Type	Analytical Paramters	Sample Depth (feet)
North Drainage Ditch	1	0	Soil	Borehole Composite	TCL inorganics & Organics, RAS & SAS Dioxins	2-5
South Drainage Ditch	1	0	Soil	Borehole Composite	TCL inorganics & Organics, RAS & SAS Dioxins	2-5
Sludge Storage Area	1	1	Soil	Borehole Grab	TCL inorganics & Organics, RAS & SAS Dioxins	8**
Former Impoundment	1	0	Soil	Borehole Grab	TCL inorganics & Organics, RAS & SAS Dioxins	8**
Former Runoff Areas	3	1 (blind duplicate for Dioxin analysis)	Soil	Borehole Composite	TCL inorganics & Organics, RAS & SAS Dioxins	.5-1
Rinsate Lagoon Area	1	0	Soil	Borehole Grab	TCL inorganics & Organics, RAS & SAS Dioxins	17**

TABLE 2 (Cont.)

SAMPLE SUMMARY

Sample Description Location	Number of Field Samples	QA/QC Duplicate	Sample Matrix	Sample Type	Analytical Paramters	Sample Depth (feet)
Area South of Rinsate Lagoon Area	8*	1	Soil	Borehole Grab	TCL inorganics & Organics, RAS & SAS Dioxins	5, 10, 20, 30
(b) (6) Yard	1	0	Soil	Borehole Composite	TCL inorganics & Organics, RAS & SAS Dioxins	.5-1
Background Sample	1	0	Soil	Borehole Composite	TCL inorganics & Organics, RAS & SAS Dioxins	2-6
City of Seattle Monitoring Well #1	1	1	Water	Grab	TCL inorganics & Organics	---
City of Seattle Monitoring Well #12-A	1	0	Water	Grab	TCL inorganics & Organics	---
Transport Blank	1	0	Water	Grab	TCL inorganics & Organics	---

* - estimated number -- deeper samples may be collected based on lithological changes or obvious presence of waste material.

** - or when native soil is encountered, as identified by the site geologist.

5.2 Sampling Locations and Rationale

General sample locations are illustrated in Figure 4. Exact sampling locations will be determined using EM survey data, aerial photographs, and based on field observations. Composite soil samples will be collected from:

- o former north and south drainage ditch locations;
- o the locations of alleged runoff leading off site to the east and south; and
- o a location north of the site (background).

Soil boring grab samples will be collected from:

- o the area beneath a former sludge storage area;
- o the area beneath the former surface impoundment;
- o the area beneath the former main rinsate lagoons; and
- o approximately two locations south of the former rinsate lagoons.

The rationale for sampling at each location is as follows:

- o **North and South Ditches** - Two drainage ditches formerly existed on site to channel surface runoff. Contaminants from the site surface may have been washed into the ditches by runoff and adsorbed to ditch sediments. One spill from the truck rinse operation to the north ditch has been documented. Because the ditches are known to have been shallow (approximately four feet deep), a composite soil sample from depths of three to five feet will be taken from each former ditch site.

- o **Sludge Storage Area** - When the truck rinse facility was operational, dredged sludge was stored in an unprotected manner on the soil surface north of the former rinsate lagoons. This area was excavated to eight feet during the lagoon closure but soil samples were not analyzed. To determine if contaminants from the sludge migrated into the soils below, a soil grab sample will be taken from beneath the former sludge storage area at a depth of approximately eight feet, or when native soil is encountered.

- o **Surface Impoundment** - Aerial photographs have revealed a large surface impoundment east of the former rinsate lagoons which was formerly not reported. The function of this impoundment is unknown. Samples will be taken due to its proximity to the lagoons. A soil grab sample from a depth of approximately eight feet (or when native soil is encountered) will be taken to determine if sludge or rinsate contaminants have migrated into the soil beneath this location. If native soil is encountered at shallow depths (two to five feet), a composite sample will be taken in lieu of the grab sample.

- **Runoff Areas** - Natural drainage routes have been documented at the northeast and southeast corners of the site property. Aerial photographs appear to reveal a road leading off site near the northeast corner which may have been a pathway for surface runoff. The owner of the adjacent eastern property has alleged that chemicals were dumped into a drainage area at the southeast corner leading off site. A third runoff area has been alleged at the southern property boundary, 20 to 30 feet west of the southeast corner. Composite soil samples from all three alleged runoff locations will be taken from depths of six inches to one foot to determine if contaminants have migrated off site following these routes.

- [redacted] **Property** - An off-site composite soil sample will be taken from the [redacted] property, immediately south of the site. [redacted] filed complaints about uncontrolled runoff on his property from the Widing facility when it was operational. The purpose of this sample is to determine if site contaminants were carried off site to the [redacted] property via surface runoff. The sample will be taken from depths of six inches to one foot.

- **Rinsate Lagoons** - During the Ecology supervised closure and excavation of the main rinsate lagoons, bis(2-ethylhexyl) phthalate was the only compound analyzed for at depths below the lagoon floor. A soil grab sample will be taken from beneath the lowest depth reached by the Ecology excavation (approximately 17 feet or when native soil is encountered) and analyzed for the full range of EPA TCL substances to ensure that contaminants beneath the former rinsate lagoons have been adequately removed.

- **Buried Waste** - It is alleged that Widing Transportation buried sludge from the truck rinsing facility on site, south of the former rinsate lagoons. An attempt will be made to locate burial areas using an EM survey. Approximately two locations will be selected for deep (30 to 40 feet) borehole soil sampling. Discrete samples will be taken at 5-foot, 10-foot, 20-foot, and 30-foot depths, followed by deeper intervals of 10 feet if necessary, or at the discretion of the site geologist pending lithological changes. Drilling will be discontinued when hardpan or water is encountered and the borehole will be sealed immediately.

- **Monitoring Well** - As part of the Midway Landfill Project, the City of Seattle has installed several monitoring wells in the vicinity of Widing Transportation. One of these is on the [redacted] property, south of the site. Ground water will be sampled from this well for comparison to previous sample results and to further monitor the shallow aquifer for site contaminants.

- **Background Samples** - A soil borehole will be drilled north of the site to characterize background soil samples. A composite sample will be taken from two to six feet in depth from this location. A City of Seattle monitoring well northwest of the site (assumed to be background) will also be sampled to provide background values for ground water.

5.3 Sampling Methods

For shallow soil boreholes in runoff areas and the (b) (6) [redacted] yard (0.5 to 1 foot) a hand driven auger will be used. Samples from the hand auger will exclude soil from the top and bottom two inches of the auger flight to prevent surface soil from being included in the sample. If possible, the sample will be collected directly from the auger flight. A Minute Man portable auger will be used for boreholes up to 12 feet in depth including the drainage ditches, sludge storage area, former impoundment, and background sample. The drill utilizes two-inch diameter solid stem auger flights, each of which is approximately three feet in length. Sample material will be collected from the augers directly as they are brought to the surface, if possible. Minute Man auger flights and hand augers will be field decontaminated between sampling locations with a steam cleaner, or by hand using scrub brushes and alconox decontamination solution, and rinsed with carbon-free water. Material from different depths will be collected with an aluminum spoon and placed in an aluminum bowl for compositing. Composite samples will be obtained by thoroughly mixing soil samples with the aluminum spoon in the aluminum bowl. After mixing, the soil will be evenly spread within the bowl and quartered. The sample will be composed of equal volumes taken from each quarter (6). Upon completion of sampling, each borehole will be sealed with bentonite.

For deeper boreholes in the former lagoon area and south of the lagoon area, a hollow-stem, continuous flight auger drill rig will be used. The auger will be field-decontaminated prior to drilling at each sampling location in the same manner as the Minute Man augers. Samples will be obtained using a split spoon sampler or core barrel sampler, and discrete grab samples will be taken at 17 feet beneath the lagoon area (or when native soil is encountered), and 5-foot, 10-foot, 20-foot, and 30-foot depths south of the lagoon area, or when lithological changes are encountered. A geologist will be present during drilling to identify native soil and lithological changes which may determine exact depths from which samples are taken. Samplers will be decontaminated prior to each grab sample taken. Each borehole will be sealed with bentonite as indicated for the shallow boreholes.

Specific requirements for dioxin sampling will be observed (7). These include:

- o protection of samples from sunlight by using amber glass sample containers if available and packing into metal paint cans;
- o preservation of samples by icing to $4^{o}C$;
- o avoiding contact by any sample with plastic or paper;
- o mixing composite soil samples in aluminum pans rather than stainless steel; and
- o including a blind duplicate sample.

To minimize potential dioxin exposure to laboratory personnel, and to minimize the quantity of potentially contaminated material, only the minimum required volume of sample material will be collected.

Ground water from two City of Seattle monitoring wells will be sampled, one of which is off the site property to the south and the second of which is to the north (assumed background). Field measurements of water level, flow direction, pH, conductivity, and temperature will be collected at each well. Monitoring wells will be purged of three volumes of water using a two-inch or four-inch submersible pump. A KV Associates Model 40 ground water flow meter will be used to determine the direction of ground water flow at each well. Grab samples will be taken using a dedicated stainless steel bailer at each well.

Sample numbers from CLP Traffic Reports will be placed on each sample container. EPA sample tags will also be attached to each sample container. If samples will be going to the Region X laboratory, sample numbers will be obtained from the USEPA.

5.4 Laboratory Notification

Prior to commencing sampling activities at the site, the Regional Sample Control Center (RSCC) of the USEPA Region X Environmental Services Division (ESD) will designate the laboratory(s) where collected samples are to be sent. E&E will notify either the USEPA Region X laboratory or the designated contract laboratory through the RSCC on the days(s) on which sampling is to occur. The team will confirm the sample documentation numbers, the number of samples to be shipped and the type of analysis to be required.

5.5 Sample Documentation and Handling

The potential evidentiary nature of the data collected during this site investigation requires that the possession of samples be traceable from the time they are collected until they are introduced as evidence in enforcement proceedings.

All sample data (date and time of collection, sample station, field measurements, etc.) will be recorded in a field notebook and a field documentation form. Sample custody seals will be placed on the front and back of all sample shipping containers (i.e., steel coolers) after the sample containers have been filled. Samples will be accompanied by Region X Field Sample Data Sheets and Chain-of-Custody Sheets, CLP Traffic Report Forms, or any other pertinent shipping/sample documentation information. These forms will be placed in a ziplock bag and taped to the inside of the ice chest. All sample documentation and Chain-of-Custody procedures will be followed as specified in the National Enforcement Investigations Center policy and procedures guidelines (May 1978, Revised June 1985).

All samples will be packed in accordance with National Enforcement Investigations Center guidelines (April 1980). All samples will be shipped according to Department of Transportation (DOT) requirements in 49 CFR Part 172.

Specific sample handling criteria are summarized in Table 3.

TABLE 3

SAMPLE HANDLING SUMMARY

Matrix	Parameter	Maximum Holding Time	Containers	Preser-vatives	Comments
Soil/ Sediment	TCL Inorganics	6 mos.	1 8-oz wide-mouth glass jar-Teflon Lined Cap	None	
Soil/ Sediment	Mercury	28 days	No extra volume re-quired	None	
Soil/ Sediment	Cyanide	14 days	No extra volume re-quired	None	
Soil/ Sediment	BNA	7 days	1 8-oz wide-mouth glass jar-Teflon Lined Cap	Ice to $4^{0}C$	
Soil/ Sediment	VOA	14 days	2 120-ml glass wide-mouth vials	Ice to $4^{0}C$	
Soil/ Sediment	SAS Dioxin and Dibenzo-furan Homologs	7 days	1 4-oz wide-mouth glass jar in paint can	Ice to $4^{0}C$	Protect from Sunlight
Soil/ Sediment	RAS 2,3,7,8-TCDD	7 days	1 4-oz wide-mouth glass jar in paint can	Ice to $4^{0}C$	Protect from Sunlight
Water	TCL Inorganics	6 mos.	1 1-liter polyethylene bottle	None	

TABLE 3 (Cont.)

SAMPLE HANDLING SUMMARY

Matrix	Parameter	Maximum Holding Time	Containers	Preser-vatives	Comments
Water	Cyanides	14 days	1 1-liter polyethylene bottle		
Water	Mercury	28 days	No extra volume required		
Water	BNA	7 days	2 8-oz amber glass bottles with teflon lined caps	Ice to $4^{O}C$	
Water	VOA	14 days	2 40-ml glass vials with Teflon septa	Ice to $4^{O}C$	

5.6 Investigation-Derived Wastes

Only those wastes considered to be potentially hazardous will be drummed. Unless otherwise directed by the USEPA, all boreholes will be sealed with a 1-foot bentonite plug and backfilled with drill cuttings. Monitoring well purge water will be emptied on site with the owner's permission. Disposable clothing and equipment will be double-bagged and disposed of at a local landfill.

5.7 Personnel Safety and Equipment Decontamination

Personnel safety and decontamination procedures will be addressed in the Site Investigation Health and Safety Plan. Sampling equipment decontamination will utilize a consecutive series of the following washes:

- o alconox wash
- o clean water
- o distilled water/organic-free water rinse

Waste decontamination solvents will be drummed and left on site pending USEPA recommendations for waste disposal.

6.0 QUALITY ASSURANCE PROCEDURES

6.1 Quality Assurance Objectives

The general quality assurance (QA) objectives for this project are to develop and implement procedures for obtaining and evaluating data that can be used to assess site hazards, develop and evaluate alternate remedial actions, and be legally defensible in a court of law. In order to provide legally defensible data, it is necessary that all measurement data have an appropriate degree of accuracy and reproducibility, along with assurance that samples collected are appropriately representative of actual field conditions.

All collected samples must meet the quality control objectives (i.e., for method, detection limits, precision, accuracy, completeness) for the particular parameter requested (e.g., heavy metals, base/neutral extractables, etc.) as specified by either the Contract Laboratory Program (CLP) or the USEPA Region X laboratory.

Standard Operating Procedures (SOP) have been developed that detail procedures for performing all tests at an acceptable level of quality control. The SOPs also ensure that data is intercomparable, interpretable, and defensible.

6.2 Quality Control and Assurance Procedures

6.2.1 Calibration Procedures and Frequency

All field equipment used during the site investigation will be operated, calibrated, and maintained according to the manufacturers' guidelines and recommendations. Operation, calibration, and maintenance will be performed by personnel who have been properly trained in these procedures. A routine schedule and record of instrument calibration and measurement will be maintained throughout the duration of the sampling program (Table 4).

Preventive maintenance and check procedures for field instrumentation likely to be used during a site investigation sampling are described in Table 4.

TABLE 4

CALIBRATION AND FIELD CHECK FREQUENCY SCHEDULES

Equipment *	Regular Calibration and Maintenance Required (NOTE A)	Laboratory Check Prior to Shipment (NOTE B)	Field Calibration Required Before Each Use (NOTE B)
EM-31	Bi-Annually	X	X
Explosimeter/ Oxygen Meter	Monthly	X	X
HNU/OVA	Monthly	X	X
Conductivity Meter		X	X
pH Meter		X	X
Water Level Indicator		X	X
Ground Water Flow Meter		X	

* = Equipment routinely used during a site inspection/sampling activities

Note A = To be performed by designated regional instrument repairman

Note B = With the exception of the OVA these calibrations and checks are to be performed by the site field team

6.2.2 Quality Assurance Samples and Frequency

Quality assurance samples for sample collection and laboratory performance will be accomplished by a combination of the following items:

- Duplicate samples: Duplicates will be submitted in order to evaluate field variability. The numbers of duplicate samples required by the field sampling will be at least one in 20 of each sample with the same concentration/matrix type.

- Blank samples: Sample blanks (transfer/transport) will be included in each set of water samples collected during the sampling program. The blanks will consist of either carbon-free water and/or deionized water depending on the analyses required. (Soil sample blanks are not submitted to the laboratory at this time per CLP instructions).

- Laboratory QA: Analytical procedures will be evaluated by using items such as surrogate spikes, matrix spikes, duplicates, reagent blanks, and inter-element correction checks. Triple volumes will be collected for at least one in 20 samples to meet these requirements.

6.3 Data Reduction, Validation, and Reporting

When analytical data/test data have been reduced, the method of reduction will be described in the final site inspection report. Validation of all analytical data will be performed by senior chemists at E&E or at the Region X USEPA laboratory. Laboratories participating in the CLP program will be required to submit results that are supported by sufficient back-up data and QA/QC results to enable the reviewer to conclusively determine the quality of the data. Validity of all data will be determined based on the precision and accuracy assessments required by the USEPA. Upon completion of the review, the senior chemist will be responsible for developing a QA/QC report for each analytical package. All data will be stored and maintained according to standard document control procedures.

All field measurements will be verified by the field team leader and will be recorded in a field note book for future reference. All analytical data used in the final site inspection report will be appropriately identified and included in a separate appendix within the final report.

6.4 Performance and System Audits

The Regional EPA laboratory or contract laboratory facilities used by E&E personnel will be required to take part in a series of performance and systems audits conducted by the National Enforcement Investigations Center (NEIC). Laboratory Quality Control data and performance evaluations will be submitted along with analytical results for assessment by program reviewers.

Performance and system audits for E&E sampling operations will consist of on-site reviews of field quality assurance systems and equipment for sampling, calibration, and measurement consistent with the Zone II FIT Quality Assurance Manual (Contract No. 68-01-7347). The program Quality Assurance Coordinator will develop and conduct systems audits based on the approved project Field Operations Work Plan. Guidelines provided by the NEIC for performing audits of field activities will be followed.

If for any reason the schedules or procedures cannot be followed, a "Sample Alteration Checklist" form (Appendix B) for each element changed will be completed and this will be reviewed by the Project Manager and the QA Officer/Peer Reviewer.

7.0 REPORTS

The final report for this project will contain a separate narrative section detailing the physical/chemical data collected during the site inspection. In addition, a discussion of the findings as they relate to the general area will be also be provided. Conclusions and recommendations will be developed for the site. An EPA 2070-13 form will be included in the final Site Inspection Report.

No separate report is anticipated to describe the performance of the data measurement systems or the data quality for this project. The final Site Inspection Report will contain a separate Quality Assurance Appendix memorandum from the E&E review staff that summarizes data quality information collected during the project. Sampling data will be summarized in tables by E&E using forms for sample documentation and reporting. These data summaries will be included in all reports when applicable.

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1. U.S. Environmental Protection Agency (EPA), 1987, Widing Transportation, Inc. Site File.

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4. Golder Associates, 1985, Record of Borehole MW-1, for Midway Landfill Closure Plan, Seattle Solid Waste Utility.

5. Geonics, Limited, 1979, Operating Manual for the EM-31 Non-Contacting Terrain Conductivity Meter, pp. 57.

6. U.S. EPA, 1987, A Compendium of Superfund Field Operations Methods, Vols. 1 & 2.

7. U.S. EPA, 1984, Sampling Guidance Manual for the National Dioxin Study (by Versar, Inc.)

ADDITIONAL REFERENCES

United States Environmental Protection Agency Region X, 1985, Quality Assurance Manual for Drinking Water Programs Investigations.

_____, 1982, Technical Additions to Methods for Chemical Analysis of Water and Wastes, EPA 600/4-82-055.

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_____, 1985, NEIC Policies and Procedures, National Enforcement Investigations Center, Denver, Colorado.

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APPENDIX A

EPA TARGET COMPOUND LIST (TCL)

ANALYTICAL PROTOCOLS

The standardized organic analytical methods are based on Federal Register Methods 625 (B/N/A), 608 (pesticide), 624 (VOA), EPA Methods for Chemical Analysis of Water and Wastes (MCAWW), and Test Methods for Evaluating Solid Wastes (SW-846) modified for CLP use in the analysis of both water and soil samples.

TABLE A-1

ORGANICS ANALYSES

Volatile Compounds (VOA)	Contract Required Quantitation Limits *	
	Low Concentration Water [a] (ug/l)	Low Concentration Soil/Sediment [b] (ug/kg)
1. Chloromethane	10	10
2. Bromomethane	10	10
3. Vinyl Chloride	10	10
4. Chloroethane	10	10
5. Methylene Chloride	5	5
6. Acetone	10	10
7. Carbon Disulfide	5	5
8. 1,1-Dichloroethene	5	5
9. 1,1-Dichloroethane	5	5
10. trans-1,2-Dichloroethene	5	5
11. Chloroform	5	5
12. 1,2-Dichloroethane	5	5
13. 2-Butanone	10	10
14. 1,1,1-Trichloroethane	5	5
15. Carbon Tetrachloride	5	5
16. Vinyl Acetate	10	10
17. Bromodichloromethane	5	5
18. 1,2-Dichloropropane	5	5
19. trans-1,3-Dichloropropene	5	5
20. Trichloroethene	5	5
21. Dibromochloromethane	5	5
22. 1,1,2-Trichloroethane	5	5
23. Benzene	5	5
24. cis-1,3-Dichloropropene	5	5
25. 2-Chloroethylvinylether	10	10
26. Bromoform	5	5
27. 2-Hexanone	10	10
28. 4-Methyl-2-Pentanone	10	10
29. Tetrachloroethene	5	5
30. 1,1,2,2-Tetrachloroethane	5	5
31. Toluene	5	5
32. Chlorobenzene	5	5
33. Ethyl Benzene	5	5
34. Styrene	5	5
35. Total Xylenes	5	5

TABLE A-1 (CONT.)

Semivolatile Organic Compounds (BNA)	Contract Required Quantitation Limits * Low Concentration Water [c] (ug/l)	Low Concentration Soil/Sediment [d] (ug/kg)
1. Phenol	10	330
2. bis(-2-Chloroethyl)Ether	10	330
3. 2-Chlorophenol	10	330
4. 1,3-Dichlorobenzene	10	330
5. 1,4-Dichlorobenzene	10	330
6. Benzyl Alcohol	10	330
7. 1,2-Dichlorobenzene	10	330
8. 2-Methylphenol	10	330
9. bis(2-Chloroisopropyl)Ether	10	330
10. 4-Methylphenol	10	330
11. N-Nitroso-Di-n-propylamine	10	330
12. Hexachloroethane	10	330
13. Nitrobenzene	10	330
14. Isophorone	10	330
15. 2-Nitrophenol	10	330
16. 2,4-Dimethylphenol	10	330
17. Benzoic Acid	50	1600
18. bis(2-Chloroethoxy)Methane	10	330
19. 2,4-Dichlorophenol	10	330
20. 1,2,4-Trichlorobenzene	10	330
21. Naphthalene	10	330
22. 4-Chloroanaline	10	330
23. Hexachlorobutadiene	10	330
24. 4-Chloro-3-Methylphenol	10	330
25. 2-Methylnaphthalene	10	330
26. Hexachlorocyclopentadiene	10	330
27. 2,4,6-Trichlorophenol	10	330
28. 2,4,5-Trichlorophenol	50	1600
29. 2-Chloronaphthalene	10	330
30. 2-Nitroanaline	50	1600
31. Dimethyl Phthalate	10	330
32. Acenaphthylene	10	330
33. 3-Nitroaniline	50	1600
34. Acenaphthene	10	330
35. 2,4-Dinitrophenol	50	1600

TABLE A-1 (CONT.)

Semivolatile Organic Compounds (BNA)	Contract Required Quantitation Limits * Low Concentration Water [c] (ug/l)	Low Concentration Soil/Sediment [d] (ug/kg)
36. 4-Nitrophenol	50	1600
37. Dibenzofuran	10	330
38. 2,4-Dinitrotoluene	10	330
39. 2,6-Dinitrotoluene	10	330
40. Diethylphthalate	10	330
41. 4-Chlorophenyl-phenylether	10	330
42. Fluorene	10	330
43. 4-Nitroaniline	50	1600
44. 4,6-Dinitro-2-Methylphenol	50	1600
45. N-Nitrosodiphenylamine	10	330
46. 4-Bromophenyl-phenylether	10	330
47. Hexachlorobenzene	10	330
48. Pentachlorophenol	50	1600
49. Phenathrene	10	330
50. Anthracene	10	330
51. Di-n-Butylphthalate	10	330
52. Fluoranthene	10	330
53. Pyrene	10	330
54. Butylbenzylphthalate	10	330
55. 3,3'-Dichlorobenzidine	20	660
56. Benzo(a)Anthracene	10	330
57. bis(2-Ethylhexyl)Phthalate	10	330
58. Chrysene	10	330
59. Di-n-Octyl Phthalate	10	330
60. Benzo(b)Fluoranthene	10	330
61. Benzo(k)Fluoranthene	10	330
62. Benzo(a)Pyrene	10	330
63. Indeno(1,2,3-cd)Pyrene	10	330
64. Dibenz(a,h)Anthracene	10	330
65. Benzo(g,h,i)Perylene	10	330

TABLE A-1 (CONT.)

Pesticide / PCB Compounds	Contract Required Quantitation Limits * Low Concentration Water [e] (ug/l)	Low Concentration Soil/Sediment [f] (ug/kg)
1. Alpha-BHC	.05	8
2. Beta-BHC	.05	8
3. Delta-BHC	.05	8
4. Gamma-BHC (Lindane)	.05	8
5. Heptachlor	.05	8
6. Aldrin	.05	8
7. Heptachlor Epoxide	.05	8
8. Endosulfan I	.05	8
9. Dieldrin	.1	16
10. 4,4'-DDE	.1	16
11. Endrin	.1	16
12. Endosulfan II	.1	16
13. 4,4'-DDD	.1	16
14. Endosulfan Sulfate	.1	16
15. 4,4'-DDT	.1	16
16. Methoxychlor	.5	80
17. Endrin Ketone	.1	16
18. Chlordane	.5	80
19. Toxaphene	1.0	160
20. AROCLOR-1016	.5	80
21. AROCLOR-1221	.5	80
22. AROCLOR-1232	.5	80
23. AROCLOR-1242	.5	80
24. AROCLOR-1248	.5	80
25. AROCLOR-1254	1.0	160
26. AROCLOR-1260	1.0	160

* Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

a Medium Water Contract Required Quantitation Limits (CRQL) for Volatile TCL Compounds are 100 times the individual Low Water CRQL.

b Medium Soil/Sediment Contract Required Quantitation Limits (CRQL) for Volatile TCL Compounds are 100 times the individual Low Soil/Sediment CRQL.

TABLE A-1 (CONT.)

c Medium Water Contract Required Quantitation Limits (CRQL) for Semivolatile TCL Compounds are 100 times the individual Low Water (CRQL).

d Medium Soil/Sediment Contract Required Quantitation Limits (CRQL) for Semivolatile TCL Compounds are 60 times the individual Low Soil/Sediment (CRQL).

e Medium Water Contract Required Quantitation Limits (CRQL) for Pesticide/PCB TCL Compounds are 100 times the individual Low Water (CRQL).

f Medium Soil/Sediment Contract Required Quantitation Limits (CRQL) for Pesticide/PCB TCL Compounds are 60 times the individual Low Soil/Sediment (CRQL).

TABLE A-2

INORGANIC ANALYSES

Element	Contract Required Quantitation Limits * Low Concentration Water (ug/l)
Aluminum	200
Antimony	60
Arsenic	10
Barium	200
Beryllium	5
Cadmium	5
Calcium	5000
Chromium	10
Cobalt	50
Copper	25
Iron	100
Lead	5
Magnesium	5000
Manganese	15
Mercury	0.2
Nickel	40
Potassium	5000
Selenium	5
Silver	10
Sodium	5000
Thallium	10
Vanadium	50
Zinc	20
Cyanide	10

* Specific detection limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

APPENDIX B

SAMPLE ALTERATION CHECKLIST

SAMPLE ALTERATION CHECKLIST

Project Name and Number:

____

Material to be Sampled:

____

Measurement Parameter:

____

Standard Procedure for Field Collection & Laboratory Analysis
(cite references):

____
____
____
____
____
____

Reason for Change in Field Procedure or Analytical Variation:

____
____
____
____
____
____

Variation from Field or Analytical Procedure:

____
____
____
____
____
____

Special Equipment, Materials, or Personnel Required:

____
____
____
____
____
____

Initiator's Name: ______________________________ Date: ______________

Project Approval: ______________________________ Date: ______________

Laboratory Approval: ___________________________ Date: ______________

QA Officer/Reviewer: ___________________________ Date: ______________

Sample Control Center: _________________________ Date: ______________

APPENDIX C

SULFIDE/OXIDIZING AGENTS SCREENING METHOD

CYANIDE SAMPLE SCREENING

SUMMARY:

Sulfide and oxidizing agents (i.e., chlorine) cause interferences in the measurement of cyanide in aqueous samples and must be removed at the time of sample collection.

The following are summaries of the chemistry for the testing and removal of sulfide and oxidizing agents.

Test Summary:

- o Lead acetate test for sulfide.
- o Cadmium nitrate test for sulfide.
- o Potassium iodide test for oxidizing agents.
- o Sulfide removal procedure.
- o Oxidizing agent removal procedure.

NOTE:

Perform the sulfide spot test first. If positive, it may be assumed that oxidizing agents are not present and therefore, the oxidizing agent test need not be performed.

Both the lead acetate and cadmium nitrate tests are to be run for each sample. If, for some reason, only one of the tests is positive, the sulfide removal procedure is to be executed by the sampler.

Cadmium nitrate is very toxic and is absorbed through the skin. Extreme caution must be taken when doing sulfide testing and removal with cadmium nitrate.

Do not preserve the samples with sodium hydroxide until all tests and cleanups are completed. All cyanide samples are to be preserved with sodium hydroxide regardless of whether they were found to contain sulfide or oxidizing agents.

CYANIDE SAMPLE SCREENING CHECKLIST

Sulfide Spot Test & Cleanup:

1) Eyedropper or Pasteur pipette
2) 2 ml vial
3) Lead acetate indicator paper
4) Spatula
5) Filtration apparatus
6) Filter papers
7) Cadmium nitrate powder (toxic)
8) Sodium acetate buffer solution pH 4.0

Oxidizing Agent Spot Test & Cleanup:

1) Eyedropper or Pasteur pipette
2) Spatula
3) Filtration apparatus
4) Filter papers
5) Potassium iodide-starch indicator paper
6) Ascorbic acid (crystal)
7) Sodium acetate buffer solution pH 4.0

Sodium Hydroxide Sample Preservation:

1) Eyedropper or Pasteur pipette
2) 10 Normal Sodium hydroxide preserving solution (corrosive)
3) pH paper

Miscellaneous:

1) Plastic sandwich bags (for waste storage)
2) A few gallons of deionized water (only if sulfide or oxidizing agents are found) from decon water supply
3) Large plastic scoopula
4) Notebook
5) Disposable gloves
6) Plastic funnels

CYANIDE SAMPLE SCREENING PROCEDURES

Collect the appropriate volume of sample (at least 1 liter) in a plastic poly bottle (Note: do NOT preserve the sample with NaOH at this time). Take about 1 ml of the sample into the 2 ml vial. The spot tests will be performed on this aliquot.

1. Lead acetate indicator paper spot test for sulfide:

   a) Moisten a strip of the lead acetate indicator paper with the sodium acetate buffer solution.

   b) Using an eyedropper or Pasteur pipette, place a drop of sample to be tested on the moistened lead acetate indicator paper.

   c) Observe any color change of the lead acetate indicator paper. Darkening of the paper indicates the presence of sulfide.

2. Cadmium nitrate powder addition spot test for sulfide:

   d) Add a small portion (spatula tip) of cadmium nitrate powder to the sample aliquot. The formation of an orange precipitate indicates the presence of sulfide.

   e) If a positive test should occur for either or both tests, then the sulfide must be removed from the sample as indicated by the Sulfide Removal Procedure. Furthermore, if a positive test should occur, it may be assumed that no oxidizing agents are present in the sample and no oxidizing agent cleanup is necessary.

   If a sample tests negative for both sulfide tests, it is not necessary to do sulfide removal. The sampler is to continue with the potassium iodide-starch spot test for oxidizing agents.

3. Potassium iodide-starch spot test for oxidizing agents:

   a) Moisten a strip of KI-starch indicator paper with the sodium acetate buffer solution.

   b) Using an eyedropper or Pasteur pipette, place a drop of sample to be tested on the moistened KI-starch indicator paper.

   c) Observe any color change on the KI-starch paper. A bluish discoloration of the paper indicates the presence of oxidizing agents. Allow 60 seconds for the paper to darken.

   d) If a positive test for oxidizing agents should occur, then the oxidizing agents must be removed as described by the oxidizing agent removal procedure.

Wastes from this testing should be placed in plastic bags.

SULFIDE/OXIDIZING AGENT REMOVAL PROCEDURES

If there are any particulates present in the sample, and especially if metal cyanide complexes are suspected in the sample, then the sample must be filtered before sulfide or oxidizing agents can be removed. Save the filtrate for the sample reconstitution step.

1) Sulfide Removal Procedure:

a) To precipitate sulfide from the sample, add cadmium nitrate powder in small amounts (spatula tip) until a drop of treated sample no longer causes the lead acetate indicator paper to darken and an orange precipitate no longer forms.

b) Filter the sample to remove the cadmium sulfide precipitate. Discard the orange precipitate (a hazardous material) in a sandwich bag.

c) Reconstitute the sample by placing the filtrate and the particulate filter paper into a clean poly bottle.

d) Go to part 3, the Quality Control Procedure (oxidizing agent removal is not necessary).

2. Oxidizing Agent Removal Procedure:

a) To remove oxidizing agents in the sample, add 0.6 grams of ascorbic acid and retest the sample with KI-starch paper. Repeat addition, if necessary.

b) When a drop of ascorbic acid no longer discolors the KI-starch paper, an additional 0.6 grams of ascorbic acid should be added to the sample.

c) Reconstitute the sample by returning the particulate filter paper to the sample.

3. Quality Control Procedure:

A clean, distilled water sample should be treated as described by the pertinent removal procedure at a frequency of one per 10 samples. Label the sample as a cyanide spot test blank and note the group of corresponding samples if more than one blank was run that day.

4) Sample Preservation Procedure:

All samples and blanks must be preserved at a pH greater than or equal to 12.0 before they are sent to the laboratory for cyanide analysis. Using the pH test paper, add 10 normal sodium hydroxide to each sample and blank until a pH of 12.0 or greater is achieved (about 2 ml should be adequate for most samples).

SULFIDE/OXIDIZING AGENT REMOVAL PROCEDURES (Cont.)

5) Decontamination:

   Soap and water washing followed by several clean water rinses should be sufficient for decon of non-expendable equipment.

Wastes from these cleanups should be placed in plastic bags.

EPA
HAZARDOUS SITE EVALUATION DIVISION

Field Investigation Team Zone II

CONTRACT NO. 68-01-7347

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International Specialists in the Environment